

1 Boolean Logic cheatsheet

Table 1: Boolean binary functions

A B	TTTT TFTF	Definition	Expression	Description 1	Description 2
	TTTT	$A \vee \neg A$	\top	1. Tautology	One function
	TTTF	$A \vee B$	$A \mid B$	Disjunction	OR
	TTFT	$A \vee \neg B$	$A \leftarrow B$	2. Implication	Subjunction
	TTFB	A		1. Identity	
	TFTT	$\neg A \vee B$	$A \rightarrow B$	1. Implication	Subjunction
	TFTF	B		2. Identity	
	TFFT	$(A \wedge B) \vee \neg(A \vee B)$	$A \leftrightarrow B$	Bijunction	Biconditional
	TFFF	$A \wedge B$	$A \& B$	Conjunction	AND
	FTTT	$\neg(A \wedge B)$	$A \uparrow B$	Negate-Conjunction	NAND
	FTTF	$\neg(A \wedge B) \wedge (A \vee B)$	$A \otimes B$	Antivalence	XOR
	FTFT	$\neg B$		2. Negation	
	FTFF	$A \wedge \neg B$	$A \rightarrow B$	1. Difference	Nonimplication
	FFTT	$\neg A$		1. Negation	
	FFTF	$\neg A \wedge B$	$A \leftarrow B$	2. Difference	Converse nonimplication
	FFFT	$\neg(A \vee B)$	$A \downarrow B$	Negate-Disjunction	NOR
	FFFF	$\neg(A \vee \neg A)$	\perp	2. Tautology	Zero function

Note: Subjunction equals to the phrase "If A, then B"

1.1 Commutative law

$$A \wedge B \Leftrightarrow B \wedge A$$

$$A \vee B \Leftrightarrow B \vee A$$

1.4 Identity laws

$$A \wedge T \Leftrightarrow A$$

$$A \vee F \Leftrightarrow A$$

1.7 Idempotence laws

$$A \wedge A \Leftrightarrow A$$

$$A \vee A \Leftrightarrow A$$

1.2 Assoziative law

$$A \wedge (B \wedge C) \Leftrightarrow (A \wedge B) \wedge C$$

$$A \vee (B \vee C) \Leftrightarrow (A \vee B) \vee C$$

1.5 Zero / One laws

$$A \wedge F \Leftrightarrow F$$

$$A \vee T \Leftrightarrow T$$

1.8 Merging laws

$$A \wedge (A \vee B) \Leftrightarrow A$$

$$A \vee (A \wedge B) \Leftrightarrow A$$

1.3 Distributive law

$$A \wedge (B \vee C) \Leftrightarrow (A \wedge B) \vee (A \wedge C)$$

$$A \vee (B \wedge C) \Leftrightarrow (A \vee B) \wedge (A \vee C)$$

1.6 Complementary laws

$$A \wedge \neg A \Leftrightarrow F$$

$$A \vee \neg A \Leftrightarrow T$$

1.9 Other notations

$$A \wedge B \Leftrightarrow A * B \Leftrightarrow A \cdot B \Leftrightarrow AB$$

$$A \vee B \Leftrightarrow A + B$$